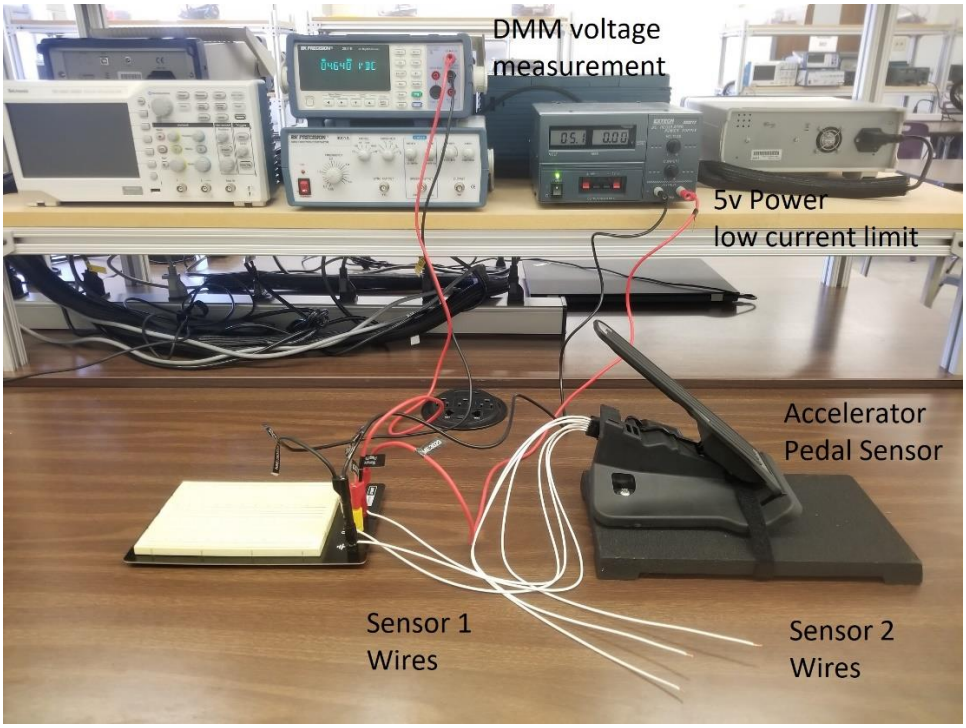
Sensor Calibration Background



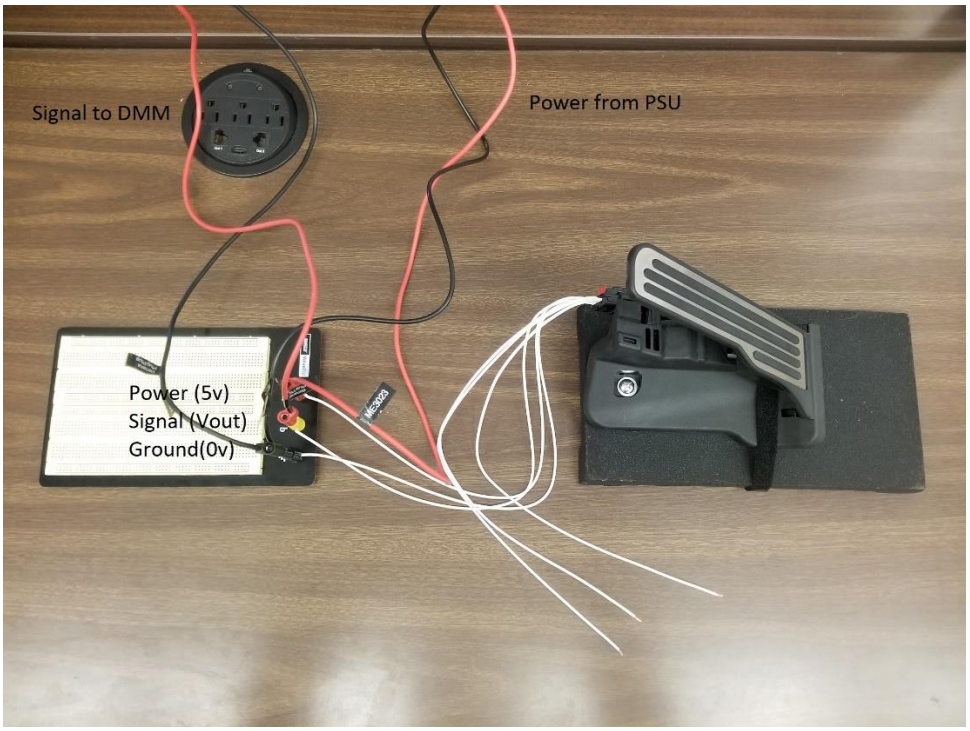




Figure 1 – Equipment Setup

Figure 2 – APP sensor wiring diagram (source: corvette forum)

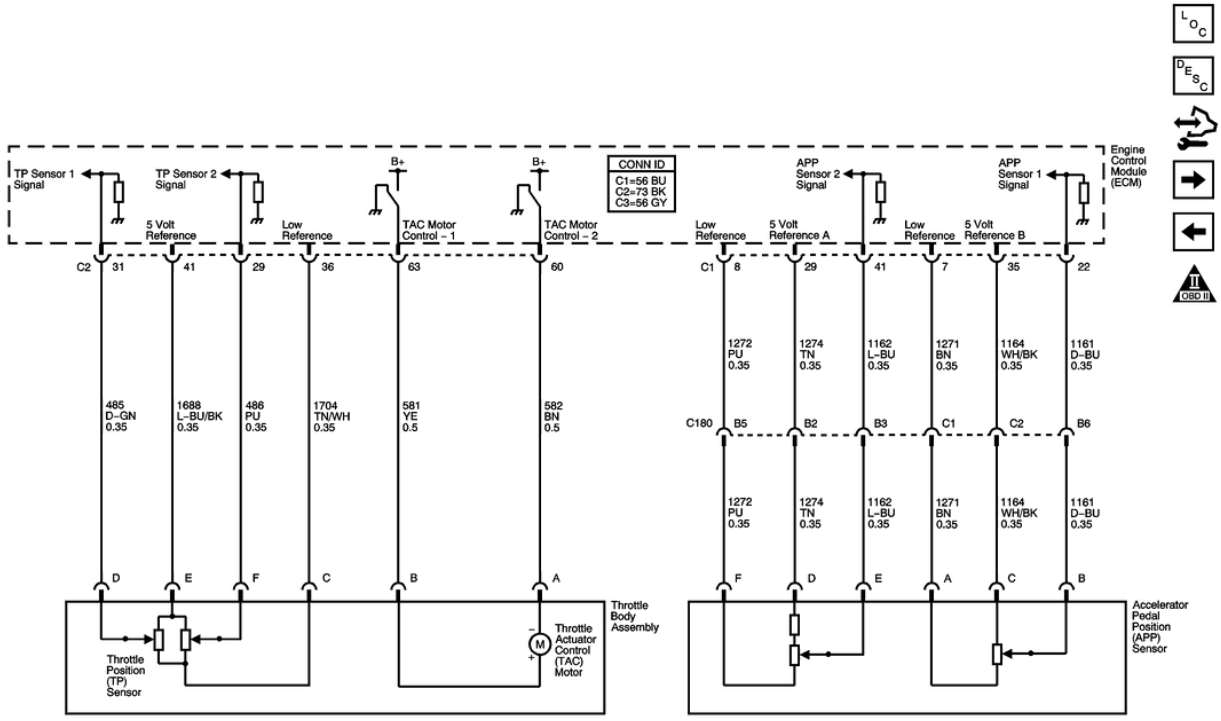
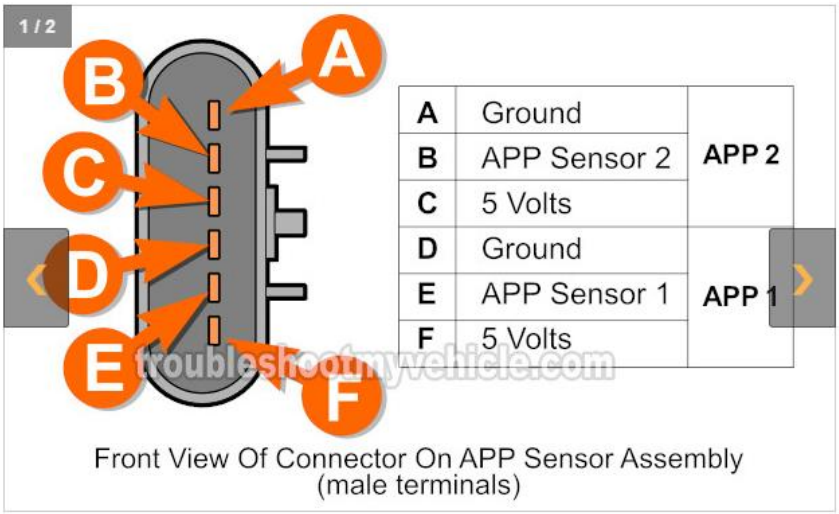



Figure 3 – APP sensor connector pinout (source:




Document Bounty: 10 points for an wiring diagram with reference for GM P/N: 23418313

Linear Least Square Regression (see lecture module Calibration Topic 3 for more infomation)

(reference: Theory and Design of Mechanical Measurements Ch 4.7 – Regression Analysis)

Model:

$$y_m = a_0 + a_1 x$$

Coefficients:

$$a_0 = \frac{\sum_{i=1}^{N} x_i \sum_{i=1}^{N} x_i y_i - \sum_{i=1}^{N} x_i^2 \sum_{i=1}^{N} y_i}{(\sum_{i=1}^{N} x_i)^2 - N \sum_{i=1}^{N} x_i^2}$$

$$a_1 = \frac{\sum_{i=1}^{N} x_i \sum_{i=1}^{N} y_i - N \sum_{i=1}^{N} x_i y_i}{(\sum_{i=1}^{N} x_i)^2 - N \sum_{i=1}^{N} x_i^2}$$

Correlation Coefficient (Goodness of Fit):

$$r = \frac{N \sum_{i=1}^{N} x_i y_i - \sum_{i=1}^{N} x_i \sum_{i=1}^{N} y_i}{\sqrt{N \sum_{i=1}^{N} x_i^2 - (\sum_{i=1}^{N} x_i)^2} \sqrt{N \sum_{i=1}^{N} y_i^2 - (\sum_{i=1}^{N} y_i)^2}}$$